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## (54) IMPROVEMENTS IN OR RELATING TO MARKING OF SHEET MATERIAL

(71) We, B.V. SPECIAAL-  
 HANDELS-EN OFFSETDRUKKERIJ  
 EN BROCHEERINRICHTING  
 EUROPRINT, of Wildervank,  
 Netherlands, a Dutch Body Corporate, do  
 hereby declare the invention, for which we  
 pray that a patent may be granted to us, and  
 the method by which it is to be performed,  
 to be particularly described in and by the  
 following statement:—

This invention relates to methods of  
 marking sheet materials to avoid  
 counterfeiting.

It has been proposed hitherto to mark  
 valuable papers in order to avoid  
 counterfeiting, for instance using a special  
 type of printing such as for bank-notes,  
 securities, cheques, etc., by using a special  
 kind of paper, e.g. provided with a water-  
 mark, or by providing characteristic  
 perforations. Security against  
 counterfeiting is increased as the marking  
 method used requires more skill and more  
 expensive tools to copy.

Special printing methods are expensive,  
 and they are usually only used in the case of  
 valuable papers which are to be repeatedly  
 used and should have a relatively long  
 useful life, and which, moreover, represent  
 a relatively high value and can be printed in  
 sufficiently large numbers that the initial  
 cost of setting up the printing can be spread  
 over a large number of prints. Nevertheless  
 this has not completely excluded  
 counterfeiting, but in view of the laborious  
 nature of the counterfeiting, the damage  
 resulting therefrom in proportion to the  
 total amount, for example of money in  
 circulation, can be restricted, and  
 counterfeiters seldom remain undiscovered  
 for long periods.

In the case of valuable papers which are  
 used only once, the cost of such special  
 printing methods are too high. This applies,  
 for instance, to savings coupons or stamps  
 which are issued in increasing numbers by  
 shops etc. Such stamps are glued to a sheet  
 and are destroyed after payment of the  
 saved amount. Each stamp represents a

small value, but because of the large  
 numbers which are produced, great sums of  
 money are involved. Stamps of a big chain  
 store have recently been counterfeited in  
 large numbers, encouraged by the simple  
 design of the stamps, the latter, moreover  
 making tracing of the culprits more  
 difficult. Admission tickets for important  
 sports events are another example of  
 valuable papers which can easily be  
 counterfeited with only little skill, and  
 because of the uniqueness and the simple  
 design of such tickets, tracing of the  
 counterfeiters is very difficult. This is made  
 even more so by this kind of counterfeiting  
 often being the work of occasional  
 counterfeiters.

The use of a special paper, for instance  
 with a water-mark, for stamps of this kind  
 is not a solution either, as inspection of the  
 water-mark on the stamps after they have  
 been adhered to a sheet can be difficult.  
 For admission tickets made of thin  
 cardboard, this method is completely out of  
 the question.

Important documents are often provided  
 with characteristic perforations, for  
 instance when changes in, for example the  
 number of a passport, are to be prevented.  
 For marking valuable papers, in particular  
 in large numbers, this method is unsuitable  
 if the printing on the paper can easily be  
 imitated, since a perforation of the usual  
 kind can be imitated without difficulty.

Two types of device have been proposed  
 for providing perforations, namely devices  
 with punching pins which are movable  
 transverse to the stationary material to be  
 perforated, and devices with pin drums  
 rotating with the sheet material to be  
 perforated. The former devices are in  
 general suitable for perforating an often  
 large number of superposed sheets, and the  
 latter devices are mainly suitable for  
 continuously perforating uninterrupted  
 moving webs of paper or similar materials.

In both cases the pins and the holes in co-  
 operating matrix plates are of circular  
 section, since otherwise a regular

perforation edge would not be obtained. The distance between adjacent holes of the perforation cannot be very small or material between the holes would be torn by the rather substantial forces involved in hole-formation. Moreover the holes cannot be made too small because of the required strength of the pins. In consequence, such perforations can be imitated by hand, so that this method is not suitable for marking other than by the use of a serial number which only has sense in the case of value papers or documents which can be compared with an original master document or the like.

According to the present invention there is provided a method of marking a paper or cardboard sheet material, the method comprising forming a pattern of spaced, non-circular holes (as herein defined) in the sheet material by grinding or shaving away the sheet material, the holes being such that they can be seen with the naked eye, and the spacing between nearest neighbouring holes is less than the smallest dimension of said nearest neighbouring holes, said smallest dimension being measured between parallel lines within which the hole is situated.

Using a method in accordance with the invention, it is possible to avoid counterfeiting of documents in the form of paper or cardboard sheet materials.

The present invention further provides a marked paper or cardboard sheet material having a pattern of non-circular holes (as herein defined) therein formed by grinding or shaving away the sheet material, the neighbouring holes being separated by a distance less than the smallest dimension of the said nearest neighbouring holes, and such that they can be seen with the naked eye, said smallest dimension being measured between parallel lines within which the hole is situated.

Marked paper or cardboard sheet materials embodying the invention have patterns of holes which can be used to avoid counterfeiting of documents made from such materials.

As used herein, the term "non-circular holes" means holes which when viewed perpendicular to the plane of the sheet material appear with the naked eye to be non-circular, the holes include markings into the substance of the sheet material which extend either part-way or completely through the sheet material. Furthermore, such non-circular holes will have more than one dimension as so viewed, and the spacing between nearest neighbouring holes in the sheet material is less than the smallest of such dimension, said dimensions being measured between parallel lines within which any such holes is situated.

It is preferred to use a device which makes holes by grinding or shaving the sheet material at points where it is supported on bosses of a supporting surface, these bosses having the desired shape and mutual spacing. Devices of this kind have been proposed hitherto. They enable holes of small diameter and arbitrary shape to be made at a very small mutual spacing, and it is not practicable for a counterfeiter to construct a suitable matrix drum which is required for a characteristic hole pattern. Since the drums have to be made by specialised manufacturers, the purchaser of such drums can be traced and it is possible to guard against the illegal acquisition of specific patterns.

The present invention can be used for marking all kinds of paper and cardboard, and it can therefore be used for very different kinds of valuable papers and the like, including admission tickets.

Although devices suitable for making such marking patterns, and in particular their matrix drums, are rather expensive, the costs involved are once and for all, and the markings thus obtained avoid the necessity for expensive characteristic printing types. The present invention is, therefore, especially suitable for marking large numbers of valuable papers or the like constructed from cheap materials which have been printed in a simple manner and would otherwise not be effectively secure against counterfeiting.

Devices suitable for making such patterns can be arranged co-operate with a printing device, so that printing and making a hole pattern can be effected in a continuous operation. This enables tear perforations and, if necessary, transport perforations to be provided in the same operation, which is especially favourable for producing saving stamps, admission tickets and the like. It is also possible to make the holes of the tear and transport perforations of a characteristic, non-circular shape.

Such markings can be inspected quickly and without special means as to their correctness, even by unskilled people, so that they are particularly suitable for saving stamps, admission tickets, and the like.

Marking can also be performed by shaving or grinding away only a part of the thickness of the sheet material, irrespective of the thickness or the nature of the material. In this manner a so-called shadow-mark is obtained, having an effect resembling that of a water-mark.

Grinding or shaving enables very small holes having smallest dimensions of, for instance, less than 1 mm and a substantially arbitrary peripheral shape to be made at

- very small mutual spacings, for instance of less than 0.5 mm, and at a speed corresponding to the speed at which the material is printed. Although electrical discharge, sharply focussed heat radiation, and the like, can be used to make very small holes in sheet materials, it is impossible or virtually so, to control the peripheral shape of holes formed thereby.
- 10 WHAT WE CLAIM IS:—
1. A method of marking a paper or cardboard sheet material, the method comprising forming a pattern of spaced, non-circular holes (as herein defined) in the sheet material by grinding or shaving away the sheet material, the holes being such that they can be seen with the naked eye, and the spacing between nearest neighbouring holes is less than the smallest dimension of said nearest neighbouring holes, said smallest dimension being measured between parallel lines within which the hole is situated.
2. A method according to Claim 1, wherein the holes are produced by shaving or grinding the sheet material at points where it is resting on bosses of a supporting surface, the bosses having the shape and mutual spacing required for the holes.
3. A method according to either of the preceding claims, wherein the holes are made in a continuous operation following or preceding a printing operation.
4. A method according to any of the preceding claims, wherein tear and/or transport perforations are made simultaneously with said holes.
5. A method according to Claim 4, wherein the holes of the tear and/or transport perforations are non-circular as viewed perpendicular to the plane of the sheet material and/or are separated from nearest neighbouring holes of the tear and/or transport perforations by a distance less than the smallest dimension of said nearest neighbouring holes of the perforations, said smallest dimensions of the holes of the perforations being measured between parallel lines within which the hole is situated.
6. A marked paper or cardboard sheet material having a pattern of non-circular holes (as herein defined) therein formed by grinding or shaving away the sheet material, nearest neighbouring holes being separated by a distance less than the smallest dimension of the said nearest neighbouring holes, and such that they can be seen with the naked eye, said smallest dimension being measured between parallel lines within which the hole is situated.
7. A sheet material according to Claim 6, having a tear and/or transport perforation.
8. A sheet material according to Claim 7, wherein the tear and/or transport perforation comprises non-circular holes as viewed perpendicular to the plane of the sheet material and/or the nearest neighbouring holes of the tear and/or the transport perforations are separated by a distance less than the smallest dimension of said nearest neighbouring holes of the perforations, said smallest dimensions of the holes of the perforations being measured between parallel lines within which the holes of the perforations are situated.
9. A method of marking a sheet material, the method being substantially as hereinbefore described.
10. A sheet material marked by a method as claimed in any of Claims 1 to 5.

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